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Date: July 28, 2008

/Luke Clossman/  
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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re patent application of:

Appellant(s): Ranganathan Krishnan, *et al.*

Examiner: Mounir Moutaouakil

Serial No: 10/810,457

Art Unit: 2619

Filing Date: March 26, 2004

Conf. No: 9317

Title: SYNCHRONOUS INTER-PICONET ROUTING

**Mail Stop Appeal Brief-Patents  
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**APPEAL BRIEF**

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Dear Sir:

Appellants submit this brief in connection with an appeal of the above-identified patent application. Payment is being submitted via credit card in connection with all fees due regarding this appeal brief. In the event any additional fees may be due and/or are not covered by the credit card, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1063 [QUALP841US].

**I. Real Party in Interest (37 C.F.R. §41.37(c)(1)(i))**

The real party in interest in the present appeal is Qualcomm Incorporated, the assignee of the present application.

**II. Related Appeals and Interferences (37 C.F.R. §41.37(c)(1)(ii))**

Appellants' legal representative and/or the assignee of the present application are not aware of any appeals or interferences which may be related to, will directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**III. Status of Claims (37 C.F.R. §41.37(c)(1)(iii))**

Claims 1-27 stand rejected by the Examiner. The rejection of claims 1-27 is being appealed.

**IV. Status of Amendments (37 C.F.R. §41.37(c)(1)(iv))**

All claims are original and have not been amended at any time during prosecution.

**V. Summary of Claimed Subject Matter (37 C.F.R. §41.37(c)(1)(v))**

The claims under consideration in the present Appeal are directed to scheduling wireless communications within a piconet and/or between two different piconets. For example, in one embodiment, a wireless communication terminal schedules an inter-piconet (within a single piconet) transmission between a first transmitting terminal and a first receiving terminal within the same piconet using a system scheduler configured to schedule the inter-piconet transmission by scheduling a power level that satisfies a target quality parameter at the first receiving terminal (paragraph 43, lines 4-7). The scheduler is further configured to schedule an intra-piconet (between piconets) transmission between a second transmitting terminal located in a first piconet and a second receiving terminal located in a second piconet by scheduling a power level for this intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, wherein, the intra-piconet transmission is scheduled simultaneously with the inter-piconet transmission (paragraph 75, lines 1-2).

**VI. Grounds of Rejection to be Reviewed (37 C.F.R. §41.37(c)(1)(vi))**

A. Whether claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 are unpatentable under 35 U.S.C. §103(a) over Gandolfo (US 7,184,767) in view of Cruz et al (US 2006/0046658).

B. Whether claims 3 and 17 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Cruz and further in view of Agrawal et al (US 6,072,990).

C. Whether claims 7 and 21 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Cruz and further in view of Palin et al (US 2003/0083015).

D. Whether claims 9 and 23 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Cruz and further in view of Umeda et al (US 5,920,817).

E. Whether claims 10 and 24 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Sun et al (Interference-aware MAC scheduling and SAR policies for Bluetooth scatternets).

**VII. Argument (37 C.F.R. §41.37(c)(1)(vii))****A. Rejection of Claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 Under 35 U.S.C. §103(a)**

Claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gandolfo (US 7,184,767) in view of Cruz et al (US 2006/0046658). It was alleged that Gandolfo teaches a method of scheduling communications, comprising scheduling an inter-piconet transmission between first transmitting and receiving terminals (Figure 6c, the communication between A-2 and B-2) and scheduling an intra-piconet transmission between second transmitting and receiving terminals (Figure 3, devices 321 and 325 in communication with each other). It was admitted that Gandolfo fails to teach scheduling a power level for the inter-piconet and intra-piconet transmission that will satisfy quality parameters of the receiving terminals and that Gandolfo does not teach that the intra-piconet transmission is scheduled simultaneously with the inter-piconet transmission. It was further

alleged that Cruz teaches these features in paragraphs 0017 and 0099, and that it would have been obvious for one skilled in the art to combine the two references to arrive at Appellants' claimed subject matter.

Appellants do not believe that the combination of Gandolfo and Cruz teach each and every element of Appellants' claimed subject matter. For example, Appellants do not believe that Gandolfo teaches a method for scheduling communications between first and second terminals in an intra-piconet and scheduling communications between first and second terminals in an inter-piconet. In fact, Appellants do not believe that Gandolfo mentions anything at all about scheduling an intra-piconet communication or scheduling an inter-piconet communication.

It was alleged that Gandolfo teaches a method of scheduling communications in an inter-piconet in Figure 6c, between units A-2 and B-2. However, Figure 6c of Gandolfo simply teaches what is referred to as "indirect overlap", wherein two adjacent networks do not directly overlap, instead relying on a mutual "controller-enabled device" to allow two controllers (i.e., controller A and controller B) to communicate with each other. (See Gandolfo, column 11, lines 21-46). There is no mention of scheduling communications whatsoever in the discussion of Figure 6c, or anywhere else within Gandolfo for that matter.

It was further alleged that Gandolfo teaches scheduling an intra-piconet communication between terminals 321 and 325 in Figure 3. Appellants contend that Figure 3 simply illustrates a generic piconet, comprising a controller and several communication devices. A full description of Figure 3 can be found in column 2, lines 26-54. This description simply discusses the general nature of a piconet; that is, a controller in communication with several wireless devices. Each device is able to communicate with the controller and/or other devices within the piconet. However, there is no teaching or suggestion of how these devices communicate with each other and, more specifically, no teaching or suggestion that the communications within the piconet are scheduled in any fashion.

Based on the above discussion, Appellants do not believe that Gandolfo teaches anything with regard to the scheduling of communications, either within a piconet or between piconets. Therefore, the rejection under 35 U.S.C. §103(a) should be reversed.

Appellants also believe that the rejection to these claims based on 35 U.S.C. §103(a) must fail because Cruz fails to teach or suggest scheduling power levels for the inter-piconet and intra-piconet transmissions that satisfies quality parameters of receiving terminals and further

fails to teach or suggest that the intra-piconet transmission is scheduled simultaneously with the inter-piconet transmission.

It was alleged that Cruz teaches scheduling power levels for the inter-piconet and intra-piconet transmissions that satisfies quality parameters of receiving terminals in paragraph 0017. However, Appellants can find no mention of scheduling power levels that satisfies quality parameters of receiving terminals. Cruz teaches the determination of an “optimal schedule that provides for the base-case goal for a given parameter”, one of the parameters being “the total power” where the total power is minimized for the network. Thus, the power levels discussed in Cruz only provide for determining power levels based on not individual receivers, but on a total power goal of the entire network. Therefore, Cruz fails to teach or suggest the feature of scheduling power levels based on quality parameters of receiving terminals, as recited in independent claims 1, 11, 13, and 25. Accordingly, Appellants respectfully request that the rejection be reversed.

It was alleged that Cruz teaches “that the intra-piconet transmission is scheduled simultaneously with the inter-piconet transmission” in paragraph 0099. Cruz teaches “We find that for very low data rates (between 0 to 41 MBPS in Fig. 3) it is energy efficient to enable all the 16 clusters simultaneously, regardless of the value of thermal noise.” (Cruz, paragraph 0099). Appellants do not believe that enabling multiple clusters simultaneously can be equivalent to simultaneous scheduling, as claimed by Appellants. The term “scheduling” implies more than simple enablement of multiple devices. It suggests a coordination among multiple terminals based on some criteria. Further, Appellants do not believe that Cruz teaches or suggests simultaneous scheduling of intra and inter piconet *transmission*. Cruz simply states that all 16 clusters are *enabled* simultaneously. There is no teaching or suggestion that all 16 clusters are scheduled for simultaneous transmission, only that the clusters are *enabled* simultaneously. Therefore, Appellants believe that the rejection under 35 U.S.C. 103(a) must fail because neither Cruz nor Gandolfo teach all of the elements of Appellants’ claims.

Regarding the rejection to all dependent claims, Appellants believe they are all allowable as being dependent on allowable claims, namely claims 1, 11, 13, and 25.

**B. Rejection of Claims 3 and 17 Under 35 U.S.C. §103(a)**

Claims 3 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gandolfo in view of Cruz and further in view of Agrawal et al (US 6,072,990). It was alleged that Gandolfo and Cruz teaches all of the claim elements of claim 1, and that Agrawal discloses a method that measures the quality of a transmission using various channel quality metrics such as carrier-to-interference ration in column 1, lines 27-37.

Appellants do not believe that Gandolfo and Cruz teach all of the limitations of claims 1 and 13, as discussed above with respect to the rejection of claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 under 35 U.S.C. §103(a). Therefore, Appellants believe that claims 3 and 17 are allowable as being dependent on allowable claims, namely claims 1 and 13.

**C. Rejection of Claims 7 and 21 Under 35 U.S.C. §103(a)**

Claims 7 and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gandolfo in view of Cruz and further in view of Palin et al (US 2003/0083015). It was alleged that Gandolfo and Cruz teaches all of the claim elements of claims 1 and 13, and that Palin discloses a method of scheduling and measuring power levels based on power loss information in paragraphs 0042 and 0044.

Again, Appellants do not believe that Gandolfo and Cruz teach all of the limitations of claims 1 and 13, as discussed above with respect to the rejection of claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 under 35 U.S.C. §103(a). Therefore, Appellants believe that claims 7 and 21 are allowable as being dependent on allowable claims, namely claims 1 and 13.

**D. Rejection of Claims 9 and 23 Under 35 U.S.C. §103(a)**

Claims 9 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gandolfo in view of Cruz and further in view of Umeda et al (US 5,920,817). It was alleged that Gandolfo and Cruz teaches all of the claim elements of claims 1 and 13, and that Umeda discloses a method where a device is capable of communicating with n different elements using different spreading codes in column 7, lines 6-27.

Again, Appellants do not believe that Gandolfo and Cruz teach all of the limitations of claims 1 and 13, as discussed above with respect to the rejection of claims 1, 2, 4-6, 8, 11-16, 18-

20, and 25-27 under 35 U.S.C. §103(a). Therefore, Appellants believe that claims 9 and 23 are allowable as being dependent on allowable claims, namely claims 1 and 13.

**E. Rejection of Claims 10 and 24 Under 35 U.S.C. §103(a)**

Claims 10 and 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gandolfo in view of Sun et al (Interference-aware MAC scheduling and SAR policies for Bluetooth scatternets). It was alleged that Gandolfo teaches all of the claim elements of claims 10 and 24, except that Gandolfo fails to teach that no intra-piconet transmissions are scheduled simultaneously with the inter-piconet transmission. It was further alleged that Sun teaches a method where the inter-piconet and intra-piconet transmissions are not simultaneous because the slave nodes take turns in transmitting information (page 11, from left column 44 to right column, line 21, and 27-29; page 13, left column, lines 28-31, and right column, lines 29-39). It was then alleged that it would have been obvious for one skilled in the art to combine the two references to arrive at Appellants' claimed subject matter.

Appellants do not believe that Gandolfo teaches all of the claim elements of claims 10 and 24 with the exception of non-simultaneous transmissions between intra and inter piconets. For example, claims 10 recites "receiving in a first piconet information relating to a scheduled inter-piconet transmission from a second piconet". Claim 24 recites a similar feature: "a receiver configured to receive information relating to a scheduled inter-piconet transmission from a second piconet". Gandolfo fails to teach these features, as explained below.

Appellants do not believe that Gandolfo teaches or suggests receiving information relating to scheduling an intra or an inter piconet communication. As explained above, Gandolfo simply teaches what is referred to as "indirect overlap", wherein two adjacent networks do not directly overlap, instead relying on a mutual "controller-enabled device" to allow two controllers located in two different piconets (i.e., controller A and controller B) to communicate with each other. (See Gandolfo, column 11, lines 21-46). There is simply no mention of scheduling transmissions whatsoever anywhere within Gandolfo.

A general description of piconets is given in Gandolfo column 2, lines 26-54. This description discusses the general nature of a piconet; that is, a controller in communication with several wireless devices. Each device is able to communicate with the controller and/or other devices within the piconet. However, there is no teaching or suggestion of how these devices

communicate with each other and, more specifically, no teaching or suggestion that the communications within the piconet are scheduled in any fashion.

Thus, Appellants believe that the rejection to claims 10 and 24 should be withdrawn based on the arguments presented above, because Gandolfo fails to teach that transmissions are scheduled in either an intra or an inter piconet communication system.

### **Conclusion**

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited references. Accordingly, it is respectfully requested that the rejections of claims 1-27 be reversed.

If any additional fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [QUALP841US].

Respectfully submitted,  
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**VIII. Claims Appendix (37 C.F.R. §41.37(c)(1)(viii))**

1. (Original) A method of scheduling communications, comprising:
  - scheduling an inter-piconet transmission between first transmitting and receiving terminals including scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal; and
  - scheduling an intra-piconet transmission between second transmitting and receiving terminals, including scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, the intra-piconet transmission being scheduled simultaneous with the inter-piconet transmission.
2. (Original) The method of claim 1 further comprising transmitting the schedule for the inter-piconet transmission to the first transmitting terminal, and transmitting the schedule for the intra-piconet transmission to the second transmitting terminal.
3. (Original) The method of claim 1 wherein the quality parameter comprises a carrier-to-interference ratio.
4. (Original) The method of claim 1 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet.
5. (Original) The method of claim 1 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of the first piconet and a second piconet.
6. (Original) The method of claim 5 wherein the inter-piconet transmission comprises information, the information being destined for a third terminal, the third terminal being a member of the second piconet, but not a member of the first piconet, the method further comprising scheduling a transmission of the information from the first receiving terminal to the third terminal.

7. (Original) The method of claim 1 further comprising receiving information relating to path loss between the first transmitting and receiving terminals, the scheduled power level for the inter-piconet transmission being a function of the information.

8. (Original) The method of claim 1 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet, the method further comprising transmitting the inter-piconet transmission schedule to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

9. (Original) The method of claim 1 further comprising assigning a first spreading code to the inter-piconet transmission, and a second spreading code to the intra-piconet transmission, the first spreading code being different from the second spreading code.

10. (Original) A method of scheduling communications, comprising:  
receiving in a first piconet information relating to a scheduled inter-piconet transmission from a second piconet; and  
scheduling a plurality of intra-piconet transmissions in the first piconet with no intra-piconet transmissions being scheduled simultaneously with the inter-piconet transmission.

11. (Original) A method of scheduling communications, comprising:  
receiving in a first piconet timing information relating to a scheduled inter-piconet transmission from a first transmitting terminal in a second piconet to a first receiving terminal in the first piconet;  
scheduling an intra-piconet transmission between second transmitting and receiving terminals in the first piconet simultaneously with the inter-piconet transmission;  
scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal; and  
scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal.

12. (Original) The method of claim 11 further comprising transmitting the scheduled power level for the inter-piconet transmission to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

13. (Original) A communications terminal, comprising:

a scheduler configured to schedule an inter-piconet transmission between first transmitting and receiving terminals including scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal, the scheduler further being configured to schedule an intra-piconet transmission between second transmitting and receiving terminals including scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, the intra-piconet transmission being scheduled simultaneous with the inter-piconet transmission.

14. (Original) The communications terminal of claim 13 further comprising a transmitter configured to transmit the schedule of the inter-piconet transmission to the first transmitting terminal, and transmit the schedule of the intra-piconet transmission to the second transmitting terminal.

15. (Original) The communications terminal of claim 14 further comprising a transceiver having the transmitter, and a user interface configured to allow a user to engage in communications with another terminal through the transceiver.

16. (Original) The communications terminal of claim 15 wherein the user interface comprises a keypad, a display, a speaker and a microphone.

17. (Original) The communications terminal of claim 13 wherein the quality parameter comprises a carrier-to-interference ratio.

18. (Original) The communications terminal of claim 13 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet.

19. (Original) The communications terminal of claim 13 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of the first piconet and a second piconet.

20. (Original) The communications terminal of claim 19 wherein the inter-piconet transmission comprises information, the information being destined for a third terminal, the third terminal being a member of the second piconet, but not a member of the first piconet, the scheduler being further configured to schedule a transmission of the information from the first receiving terminal to the third terminal.

21. (Original) The communications terminal of claim 13 further comprising a receiver configured to receive information relating to path loss between the first transmitting and receiving terminals, the scheduled power level for the inter-piconet transmission being a function of the information.

22. (Original) The communications terminal of claim 13 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet, the communications terminal further comprising a transmitter configured to transmit the inter-piconet transmission schedule to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

23. (Original) The communications terminal of claim 13 further comprising a processor configured to assign a first spreading code to the inter-piconet transmission and a second spreading code to the intra-piconet transmission, the first spreading code being different from the second spreading code.

24. (Original) A communications terminal operable in a first piconet, comprising:  
a receiver configured to receive information relating to a scheduled inter-piconet transmission from a second piconet; and  
a scheduler configured to schedule a plurality of intra-piconet transmissions in the first piconet with no intra-piconet transmissions being scheduled simultaneously with the inter-piconet transmission.

25. (Original) A communications terminal operable in a first piconet, comprising:  
a receiver configured to receive timing information relating to a scheduled inter-piconet transmission from a first transmitting terminal in a second piconet to a first receiving terminal in the first piconet; and  
a scheduler configured to schedule an intra-piconet transmission between second transmitting and receiving terminals in the first piconet simultaneously with the inter-piconet transmission, the scheduler being further configured to schedule a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal, and schedule a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal.

26. (Original) The communications terminal of claim 25 further comprising a transmitter configured to transmit the scheduled power level for the inter-piconet transmission to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

27. (Original) A communications terminal, comprising:  
means for scheduling an inter-piconet transmission between first transmitting and receiving terminals including scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal; and  
means for scheduling an intra-piconet transmission between second transmitting and receiving terminals, including scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, the intra-piconet transmission being scheduled simultaneous with the inter-piconet transmission.

**IX. Evidence Appendix (37 C.F.R. §41.37(c)(1)(ix))**

None.

**X. Related Proceedings Appendix (37 C.F.R. §41.37(c)(1)(x))**

None.